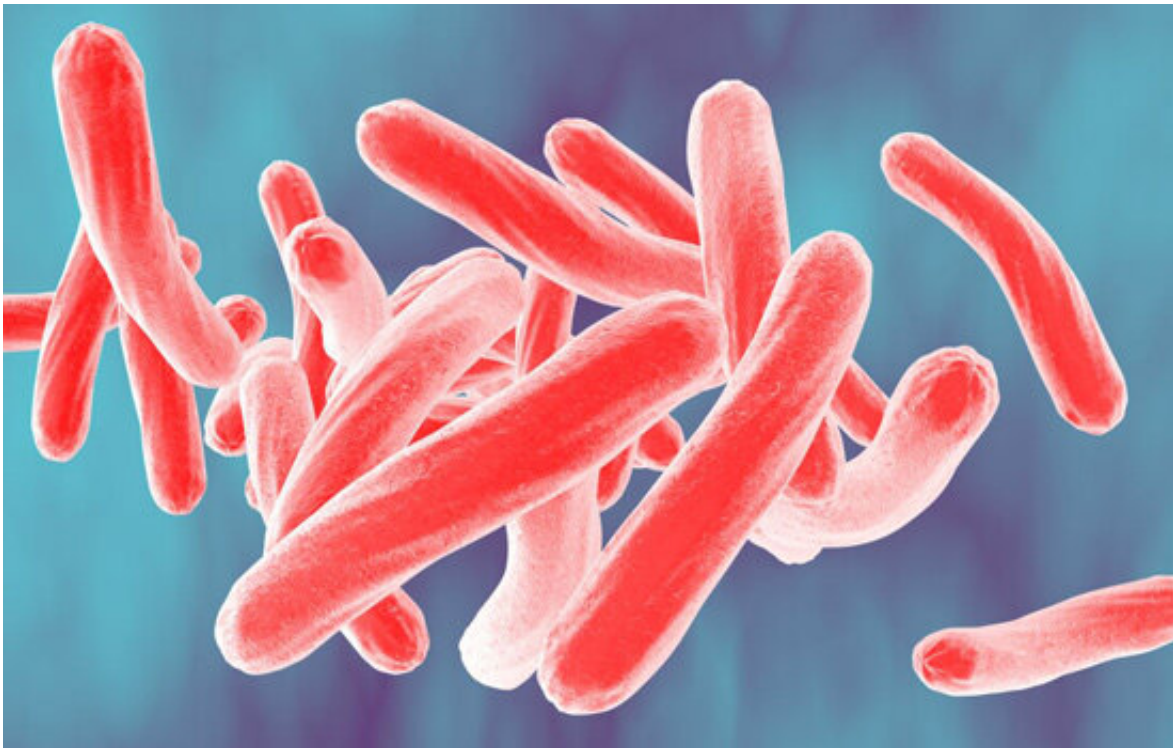


# New study reveals how TB bacteria may survive in human tissues

July 30 2019, by Silvia Dropulich

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It has been known for years that *Mycobacterium tuberculosis* can use carbon monoxide, but nobody knew why. Credit: Monash University

Carbon monoxide is an infamous and silent killer that can cause death in minutes. But while it is deadly for us, some microorganisms actually thrive on it, by using this gas as an energy source.

Associate Professor Chris Greening and his team of microbiologists

from the School of Biological Sciences, Monash University, have discovered that some pathogens depend on [carbon monoxide](#) to survive when other nutrients are not available.

The research focused on mycobacteria, a bacterial group that causes killer diseases such as tuberculosis (TB), leprosy, and Buruli ulcer. During infection, these microbes are in a hostile environment with very few nutrients to go around, meaning that anything they can do to get extra energy can be hugely advantageous.

"When [microbial cells](#) are starved of their preferred energy sources, one way they subsist is by scavenging gases such as carbon monoxide," said Monash Ph.D. student Paul Cordero, the co-lead author of the study.

"They breakdown this gas into its fundamental components, which provide the cells just enough energy to persist."

The researchers showed that an enzyme called carbon monoxide dehydrogenase is what allows mycobacteria to obtain energy from this gas. While the [energy](#) gained is not enough to allow for growth, the researchers found that carbon monoxide consumption allowed mycobacteria to survive for longer periods of time.

The study, which was supported by the Australian Research Council (ARC) and National Health and Medical Research Council (NHMRC), was published today in the renowned *ISME Journal*.

The group's findings suggest that *Mycobacterium tuberculosis* might be able to survive inside the [human host](#) by using carbon monoxide. Present in humans since ancient times, TB remains a major global health burden. This bacterium infects one quarter of the world's population and is now the leading cause of death from infectious disease worldwide.

"It has been known for years that *Mycobacterium tuberculosis* can use carbon monoxide, but nobody knew why," said fellow study co-first author, Ph.D. candidate Katie Bayly.

"Based on these findings, we predict that it uses this gas to its advantage to persist inside human lungs," she said.

"Our [immune cells](#) actually make small amounts of [carbon](#) monoxide, which the bacterium may be able to use as an [energy supply](#) while dormant."

Dormancy allows *Mycobacterium tuberculosis* to stay alive inside patients for years. This dormant infection usually has no symptoms, but can advance into full-blown TB, for example when people become immuno-compromised.

This new discovery on the survival mechanism of mycobacteria could pave the way for new strategies to better fight communicable diseases such as tuberculosis.

**More information:** Paul R. F. Cordero et al. Atmospheric carbon monoxide oxidation is a widespread mechanism supporting microbial survival, *The ISME Journal* (2019). [DOI: 10.1038/s41396-019-0479-8](https://doi.org/10.1038/s41396-019-0479-8)

Provided by Monash University

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